

ANTHOPOTAMUS, A NEW GENUS FOR NORTH AMERICAN SPECIES PREVIOUSLY KNOWN AS POTAMANTHUS (EPHEMEROPTERA: POTAMANTHIDAE)^{1, 2}

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ABSTRACT: Comparative studies of all life stages of potamanthid mayflies worldwide have indicated that North American species historically placed in the genus *Potamanthus* are generically distinct from all Palearctic *Potamanthus*, including the type of the genus, the European species *P. luteus* (Linn.). Close phylogenetic relationships of the Nearctic species of Potamanthidae are with East Asian genera, but not Palearctic *Potamanthus*. The new genus *Anthopotamus* [type species = *A. verticis* (Say), new combination] is therefore established for the Nearctic fauna of Potamanthidae. A brief synopsis of the new genus is provided, and a biogeographic origin of the new genus is suggested.

The genus *Potamanthus* Pictet in North America was most recently reviewed by McCafferty (1975). Although the classification (McCafferty and Edmunds 1979) and the phylogeny (McCafferty 1979) of Potamanthidae within the higher groups of Ephemeroptera have been recently presented, the systematics within the family have not been studied comprehensively. Members of this clearly monophyletic family, commonly known as hacklegills (McCafferty 1981), are distributed in the Holarctic and Oriental Realms, with several genera occurring in East Asia, but only *Potamanthus* occurring in North America. We are currently conducting a revisionary study of both species and genera of the Potamanthidae. This has been possible only by bringing together material from throughout the world for comparative study.

Potamanthus, as it has been constituted, is known from North American and Eurasia. The type of the genus is *P. luteus* (Linn.), a common European species that was first described in *Ephemera* in 1767. We have studied adults and larvae of Nearctic and Palearctic *Potamanthus* in detail, including *P. luteus*. Our comprehensive comparisons with other potamanthids from the entire range of the family clearly show that species in North American are distinct from *P. luteus*. The degree of demarcation is equivalent to, or more than, that found in well-established, valid genera in the family. Asian species of *Potamanthus* do, however, agree with the type concept of the genus. Thus, the North American species constitute a separate and distinct grouping that require classification

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in a new genus. The most compelling reason for removing the Nearctic species from *Potamanthus* is our finding that they are phylogenetically removed from Palearctic *Potamanthus* and are instead more closely related to other East Asian genera.

Because ecological and behavioral data dealing with various North American potamanthid species are about to be made available for publication (Bae and McCafferty unpublished, D.C. Tarter, pers. comm.) and publication of the family revision will not be forthcoming for at least another two years, it is appropriate to report this systematic finding and make a new generic name available at this time. Therefore, a new genus is established herein and a brief synopsis and discussion of the taxon is given.

Anthopotamus, new genus

Type Species. *Potamanthus verticis* (Say), 1839:42, originally as *Baetis*.

Species Included. *Anthopotamus diaphanus* (Needham), *A. distinctus* (Traver), *A. inequalis* (Needham), *A. myops* (Walsh), *A. neglectus* (Traver), *A. rufous* (Argo), *A. verticis* (Say), and *A. walkeri* (Ide), all NEW COMBINATIONS.

Distribution. Eastern half of North America.

Etymology. The name *Anthopotamus* is a masculine name taken from the Greek *anthos* (flower) and *potamos* (river). The allusion to a "river flower" is analogous to the other generic names in Potamanthidae, which also denote river flowers.

Diagnosis. Larvae of *Anthopotamus* have long, well-developed mandibular tusks, highly developed mouthpart setation, and well-developed rows of long setae on the foretibiae (see Fig. 3 in McCafferty 1975 and Fig. 7.42 in McCafferty 1981). *Potamanthus* larvae, on the other hand, have rudimentary tusks and poorly developed mouthpart and foretibiae setation in comparison (e.g. see Fig. 1b in Macan 1979). Adults of *Anthopotamus* can be distinguished from those of *Potamanthus* by the generally smaller compound eyes of the males (ratio of eye diameter to dorsal distance between compound eyes is less than 0.2), as well as a much longer prothorax, and generally lighter coloration.

Relationships. Our cladistic analysis, details of which will be published as part of the revisionary monograph, indicate that the Old World genus *Potamanthus* (sensu novum) represents an ancestral, early branching lineage within the Potamanthidae. Its sister lineage contains all other Potamanthidae, a grouping consisting of East Asian genera as well as *Anthopotamus*. Within this later lineage, *Anthopotamus* is intermediate in position between the more ancestral *Potamanthodes* and the more derived *Rhoenanthus*. *Anthopotamus* is not closely related phylogenetically to *Potamanthus*, wherein its species were previously included.

Most probably, an *Anthopotamus*-like ancestral lineage spread to North America via Beringia in pre-Pleistocene times. Vicariance of this

Holarctic, Arcto-Tertiary distribution would have probably paralleled the phyletic split into a Nearctic "*Anthopotamus*" lineage and the Palearctic "*Rhoenanthus*" lineage. If more derived elements of Potamanthidae were very widespread in the Holarctic during the Tertiary, then perhaps glacial events during the Pleistocene would explain the present absence of this element in Europe and western North America. Such Arcto-Tertiary and subsequent patterns are well documented in plant and animal genera, e.g. see review of Pielou (1979).

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LITERATURE CITED

- Macan, T.T. 1979. A key to the nymphs of the British species of Ephemeroptera with notes on their ecology. *Freshwat. Biol. Assoc.* 20: 1-80.
- McCafferty, W.P. 1975. The burrowing mayflies (Ephemeroptera: Ephemerioidea) of the United States. *Trans. Amer. Entomol. Soc.* 101: 447-504.
- McCafferty, W.P. 1979. Evolutionary trends among the families of Ephemerioidea. *Proc. 2nd Internat. Conf. Ephem.*, Krakow, 1975: 45-50.
- McCafferty, W.P. 1981. *Aquatic entomology*. Jones and Bartlett Publ., Boston. 448 pp.
- McCafferty, W.P. and G. F. Edmunds, Jr. 1979. The higher classification of the Ephemeroptera and its evolutionary basis. *Ann. Entomol. Soc. Amer.* 72: 5-12.
- Pielou, E.C. 1979. *Biogeography*. John Wiley & Sons, New York. 351 pp.